Figure 1

a

E33M40-22F   TM0272   TM0257   LjT13I23Sfi   TM0522   NFR5   E32M54-12F   TM0559   TM0168   TM0021

10/170   7/345 1/60 0/608   5/368   14/324   28/368

b   2,9 cM   1 cM   0,7 cM   2,2 cM   3,8 cM   Chr. II

LjT13I23 Sfi
1/60 TM0522
0/608

LjT13I23

LjB06D23

TM0323
4/368

BAC67I22

LjT18J10   BAC58K7   LjT01C03 Not
5/368

BAC8H12

LjT01C03

c   GGDP   RE   RZF   GT   A2L   RLK   PL   NFR5   AS   RE   HD   HD   ZF

d   5'   ATG   nfr5-3 *   nfr5-2   ▼   nfr5-1   TAA   3'

+1   +141   +1926   + 2283

e   Sparkle   N15   Sparkle   N15

PsSYM10 probe   PsSYM29 probe

Figure 2

a

SP   LysM1 LysM2 LysM3 TM   Kinase

b
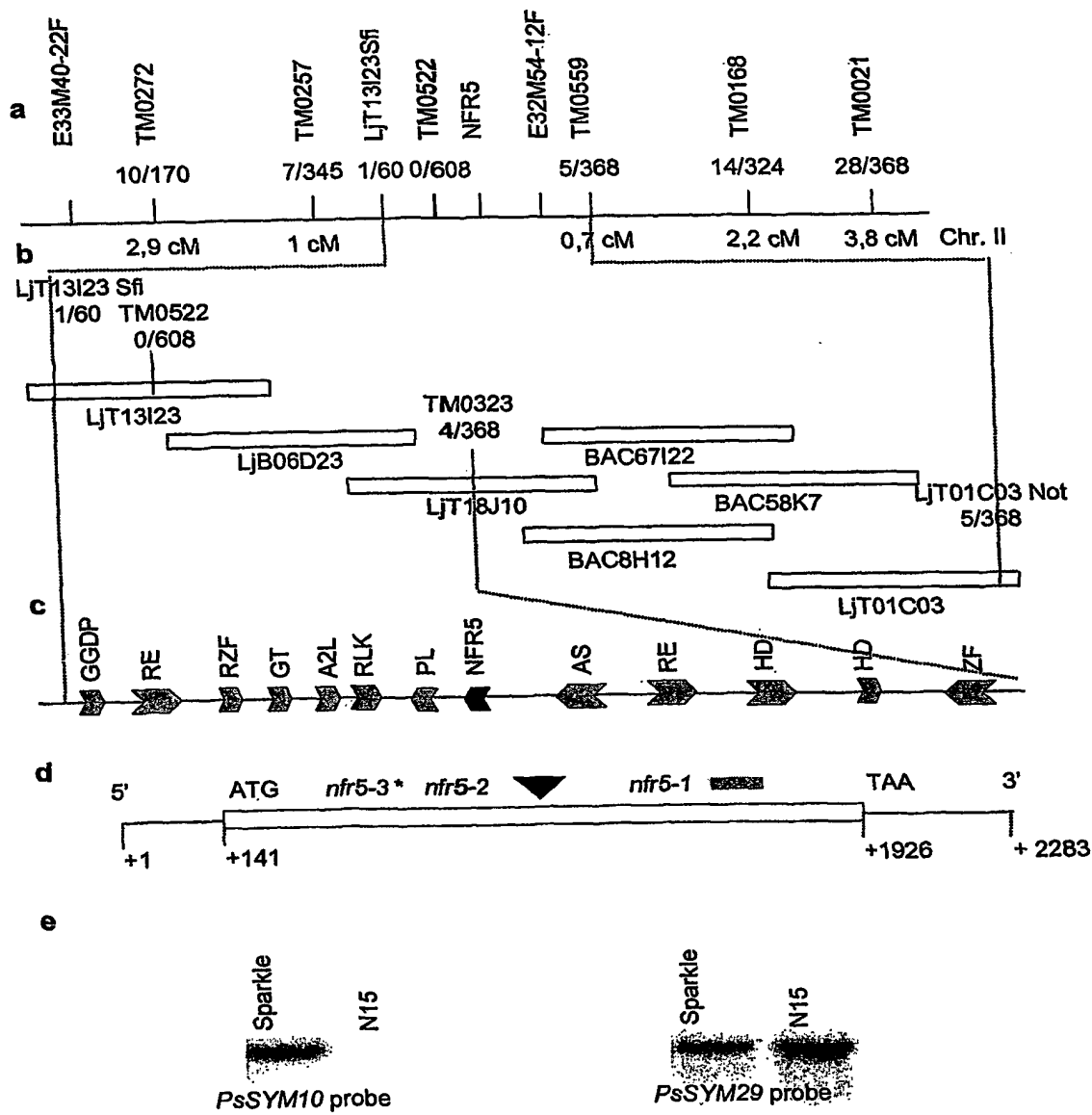
MAVFFLTSGSLSLFLALTLLFTNIAA   **SP**

RSEKISGPDFSCPVDSPPSCETYVT   **51 aa**
      *

YTAQSPNLLSLTNISDIFDISPLSIARASNIDAGKDKLVPGQ**VLLVP**   **LysM1**

VTCGCAGNHSSANTS   **113 aa**

Y**QIQLGDSYDFVATTLYENLTNWNIVQASNPGVNPYLLPERVKVVFP**   **LysM2**

LFCRCPSKNQLNKGIQYLIT   **180 aa**

YVWKPNDNVSLVSAKFGASPADILTENRYGQDFTAATNL**PILIP**   **LysM3**

VTQLPELTQPSSNGRKSSIHLL   **246 aa**

VILGITLGCTLLTAVLTGTLVYVYC   **TM**

RRRKALNRTASSAETADKLL**SGVSGYV**SKPNVYEIDEI   **KD**
                    I
MEATKDFSDECKVGESVYKANIEGRVV**AVKKIKE**GGAN**EE**LKILQKV
                           II   III
NHGN**LVKLMG**VSSGYDGNCFLVY**E**YAENGSLAEWLFSKSSGTPNS**LT**
     IV   V
WS**QRISIAVDVAVGLQYMH**EHTYPRII**HRDITTSNILLD**SNFKAKIA
    VIa   VIb
NF**AM**ARTSTNPMMPKI**DVFAFG**VLLIELLTGRKAMTTKENGEVVMLW
VII   IX
KDMWEIFDIEENREERIRKWMDPNLESFYHIDNALSLASLAVNCTAD

KSL**SRP**SMAEIVLSLSFLTQQSSNPTLERSLTSSGLDVEDDAHIVTS
     XI
ITAR   **595 aa**

Figure 2

c

```
NFR5M1     52:YTAQSPNLLSLTNISDIFDISPLSIARASNIDAGKDKLVPGQVLLVP:98
SYM10M1    52:YFARSPNFLSLTNISDIFDMSPLSIAKASNIEDEDKKLVEGQVLLIP:98
M.tM1      53:YRAQSPNFLSLSNISDIFNLSPLRIAKASNIEAEDKKLIPDQLLLVP:99
RiceM1     47:YRTQSPGFLDLGNISDLFGVSRALIASANKLTTEDGVLLPGQPLLVP:93

NFR5M2    114:YQLQLGDSYDFVATTLYENLTNWNIVQASNPGVNPYLLERVKVVFP:160
SYM10M2   114:YTIKLGDNYFLVSITSYQNLTNYVEMENFNPNLSPNLLHPEIKVVVP:160
M.tM2     115:YSIKQGDNFFLSIITSYQNLTNYLFKNFNPNLSPTILLLDTKVSVP:161
RiceM2    109:YPIRPRDTFEGLAVTAFENLIDFVLVEELNEAAEAIRLEPWOEVVVP:155
VolvoxM2  106:YTIQPGDLFWAIAQR.RG..ITVDVIQSLNPGVNRARLQVCQVINVP:149
Pfam        1:YLVKKGDTLWKIARR.YG..ISVSELKSLN.GESSDNLYVGQKLKIP:43

NFR5M3    181:YVWKPNDNVSLVSAKEGASPADILTENRYGQDFTAATNLHILIP:224
SYM10M3   181:YVWQANDNVTRVSSKEGASQVDMFTEN..NQNFTASTNVEILIP:222
M.tM3     182:YVWQDNDNVTLVSSKEGASQVEMLAEN..NHNFTASTNRSVLIP:223
RiceM3    176:YVWQPGDDVSVVSALMNASAANIAASNGVAGNSTFATGQPVLIP:219
```

d

```
                VII                          VIII             IX
Cons       ...DFG.....................APE..............D.W..G

Smart  195:KIADFCLSR..DLYSDYYKVKGGKLPIRWMAPESLKEGKFTSKSDVWSFG:248
Arab   500:KIANFGVARILDEGELDLQLTRHVEGTQGYLAPEYVENGVITSKLDVFAFG:550
NFR5   448:KIANFAMARTSIN.......................PMMPKIDVFAFG:472
SYM10  449:KIANFSMARTSIN.......................SMMPKIDVFAFG:473
M.t    450:KIANFSMARTSIN.......................SMMPKIDVFAFG:474
Rice   476:KLSNFSLAKPAAMVD.....................AAATSSDVFAFG:502
```

Figure 3

```
                .10       .20       .30       .40       .50       .60       .70       .80
Lotus   1:M VFFL TSGGSLSLFLLT.LLFTNIARSEK S PDF CPVDSPPSCETYV YI WSPNL LSLNISDIF ISPL TARA: 79
Pea     1:M  IFFL SS LFLII  VTNI AG QLS   CPVDSPPSCETYV YFARSPNL LSLNISDIF MSPL IA A: 79
M.t     1:MSAFIL S S LFLVL L L TNI IA  Y SE  TCPVDSPPSCETYV YR  SPN LSLSNISDIFNL SPERIA A: 80

                .90       .100      .110      .120      .130      .140      .150      .160
Lotus  80:SNID GKD KI  Q LLIPVTCGCAGN  SANTS OIQ GDS DF A TLYENLTNWNIVQASNPGVNPYLLPERVK VF:159
Pea    80:SNID  KTI E QLLIPVTCGC RNRY ANF YII GD  TLYENLTN V ME NP PNLLPPEIKV :159
M.t    81:SNI   KII DQI LLIPVTCGC KN  ANI YS  QGD F I  ITLY NLTN L FK  NP  PTLLPLDTKVS :160

                .170      .180      .190      .200      .210      .220      .230      .240
Lotus 160:PLFCR CPSKNQL KGIQ LITYVWKENDNVS VSA KFGASPA I ENRYG DFTAA TNL LLIPVTQLPE TQPSSNGR:239
Pea   160:PLFCK CPSKNQI SKGFI HL ITYVW ANDNV  RVS KFGAS F EN     FTA TNVI LLIPVTKLPVI QPSSNGR:237
M.t   161:PLFC  CPSKNQL KGI  LLITYVW DNDNV  VS KFGAS E AEN    H FFTA NRSVLLIPVTSLPK OPSSNGR:238

                .250      .260      .270      .280      .290      .300      .310      .320
Lotus 240:K SIH LVLLGTTLC TLLTAVIHGTLVVYVCRRKALNRTAS ETADKLLSGVSGYVSKPNVYE DEIME TKDFS :318
Pea   238:KNST KP FI GLSLC  VVVLT SLVYYC  KI LNR SE ETADKLLSGVSGYVSKP YEMD IME TM SE :317
M.t   239:KSS  N LLIGLGS IIVLT  LVYYC  KI LNR S SETADKLLSGVSGYVSKP YE D IMEG T SF :318

                .330      .340      .350      .360      .370      .380      .390      .400
Lotus 319:ECKV GESVYKANL EGRVVAVKKIKEGGANEELKILQKVNHGNLVKLMGVSSGYI GNCFLVYEYAENGSIAEWLFSK SGT:398
Pea   318:CK   GESVYKANL EGRV AVKKIK  A EELKILQKVNHGNLVKLMGVSS EGNCFLVYEYAENGSIDEWLFS LS T:396
M.t   319:CK   GESVYKANL EGRV AVKKIK  A EELKILQKVNHGNLVKLMGVSS GNCFLVYEYAENGSIEEWLFS  S T:397

                .410      .420      .430      .440      .450      .460      .470      .480
Lotus 399:PN  SLITWSQRIS AMDVAWGLQYMHEHTYPRIIHRDITTSNILL SNFKAKIANFA MARTSTNP MMPKIDVFAFGVLL:475
Pea   397:N   SLITWSQRI VA DVA GLQYMHEHTYPRIIHRDITTSNILL SNFKAKIANFS MARTSTN MMPKIDVFAFGV L:476
M.t   398:N   SLITWSQRI AMDVAT GLQYMHEHTYPRIIHRDITTSNILLG SNFKAKIANFG MARTSTN MMPKIDVFAFGV L:477

                .490      .500      .510      .520      .530      .540      .550      .560
Lotus 476:IELLIGRKA TL ENGEVV LWKD MEI FDI ENREE IRKWMDPNLE FYHIDNALSLASLAVNCTADKSLSRP MAEI:555
Pea   477:IELLIG KA TT MENGEVV  LWKD W IFD E NREES RKWMDP LENFY IDNALSLASLAVNCTADKSLSRP AEI:556
M.t   478:IELLIG KA TT ENGEVV  LWKD W IFD E NREE  RKWMDP LE FY IDNALSLASLAVNCTADKSLSRP  AEI:557

                .570      .580      .590      .600
Lotus 556:VLSLSFI QSNEL ERSLTSGLD EDDAHIVTS TAR:595
Pea   557:VL LS L QSSEL LERSLTS GLD E  H VTS VAR:594
M.t   558:VL LS I QPSS  P LERSLTS GLDAE  H VTSVTAR:595
```

Figure 4

a

b

c   *Lotus*   **d**   *Pisum*

Figure 5

Figure 6

a
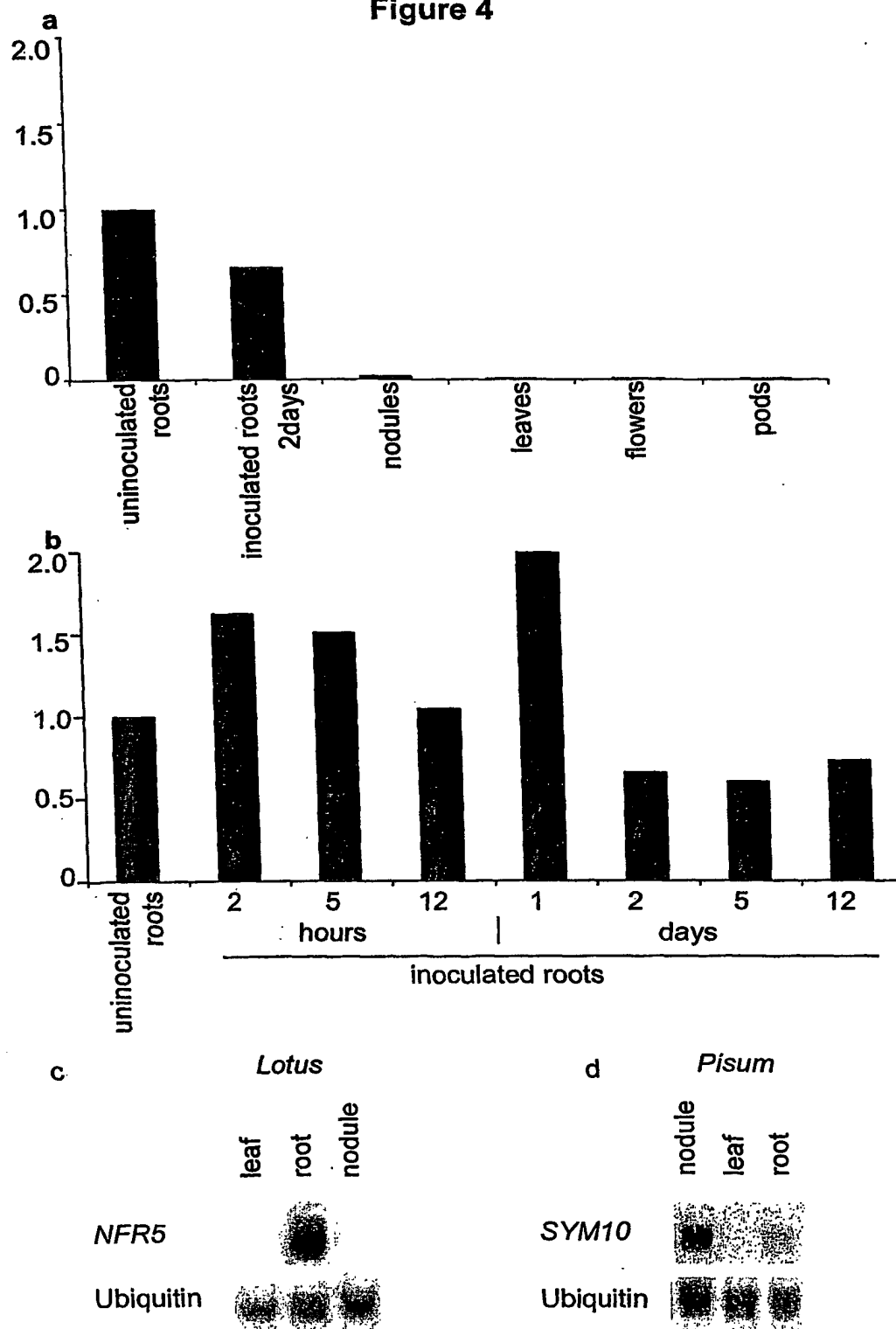
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MKLKTGLLLFFILLLGH                                              SP

VCFHVESNCLKGCDLALASYYILPGVFILQNITTFMQSEIVSSNDAITS
YNKDKILNDINIQSFQRLNIPFPCDCIGGEFLGHVFE                          103

YSASKGDTYETIANLYYANLTTVDLLKRFNSYDPKNIPVNAKVNVT                 LysM1

VNCSCGNSQVSKDYGLFIT                                            168

YPIRPGDTLQDIANQSSLDAGLIQSFNPSVNFSKDSGIAFIP                     LysM2

GRYKNGVYVPLYHR                                                 224

TAGLASGAAVGISIAGTFVLLLLAFCMYV                                  TM

RYQKKEEEKAKLPTDISMALSTQD (GN)A SSSAEYETSGSSGPGTASAT
GLTSIMVAKSMEFSYQELAKATNN                                       322(324)

FSLDNKIGQGGFGAVYYAELRGKKTAIKKMDVQASTEFLCELKVLTHV              KD
          I               II              III
HHLNLVRLIGYCVEGSLFLVYEHIDNGNLGQYLHGSGKEPLPWSSRVQIA
    IV              V                       VIa
LDAARGLEYIHEHTVPVYIHRDVKSANILIDKNLRGKVADFGLTKLIEVG
   VIa              VIb                  VII
NSTLQTRLVGTFGYMPPEYAQYGDISPKIDVYAFGVVLFELISAKNAVLKT           621(623)
          VIII      *              IX
GELVAESKGLVALFEEALNKSDPCDALRKLVDPRLGENYPIDSVLKIAQLG
      *
RACTRDNPLLRPSMRSLVVALMTLSSLTEDCDDESSYESQTLINLLSVR*
          XI
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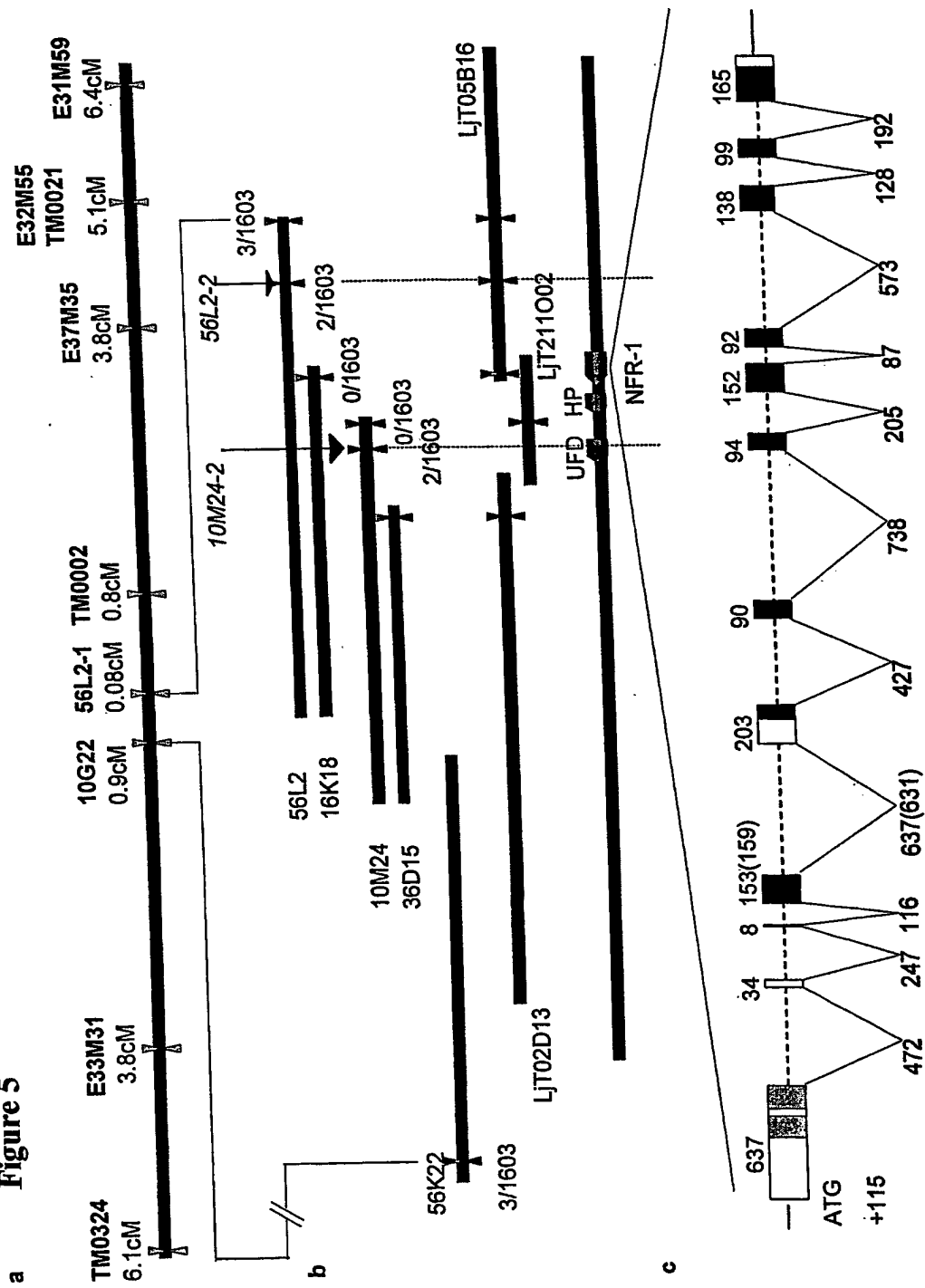
b

```
SMART0257        YTVKKGDTLSSIARRYGISVS--DTELNNILTDNLQVGQFKIP-
NFR1-M1      104-YSASKGDTYETIANLYYANLTTVDLLKRFNSYDPKNIPVNAKVNT—149
At21630-M1   105-YSVRQEDIYERVAISNVANTTMESIQARNPFPATNTLSTTNVLV-151

SMART0257        YTVKKGDTLSSIARRYGISVSDLLENN-ILDTDNLQVQKLKIP
NFR1-M2      167-YPIRPGDTLQDIANQSSLDAGLIQSFNT-SVNFSKDSG-IAFIP-208
At21630-M2   170-YPLRPEDSTSSIARSSGVSADIIDRYNT-GVNFNSGNG-VYVP-211
BAB89226-M2  168-YAVQDGDTIGNIASLFRSSWKDTLDTNFRVANPDFIKPTWSLFIP-212
Volvox M      42-YTIQFGDTFWAIAQRRGTTVDVTOSFNF-GVNFARLQVQVINVP-85
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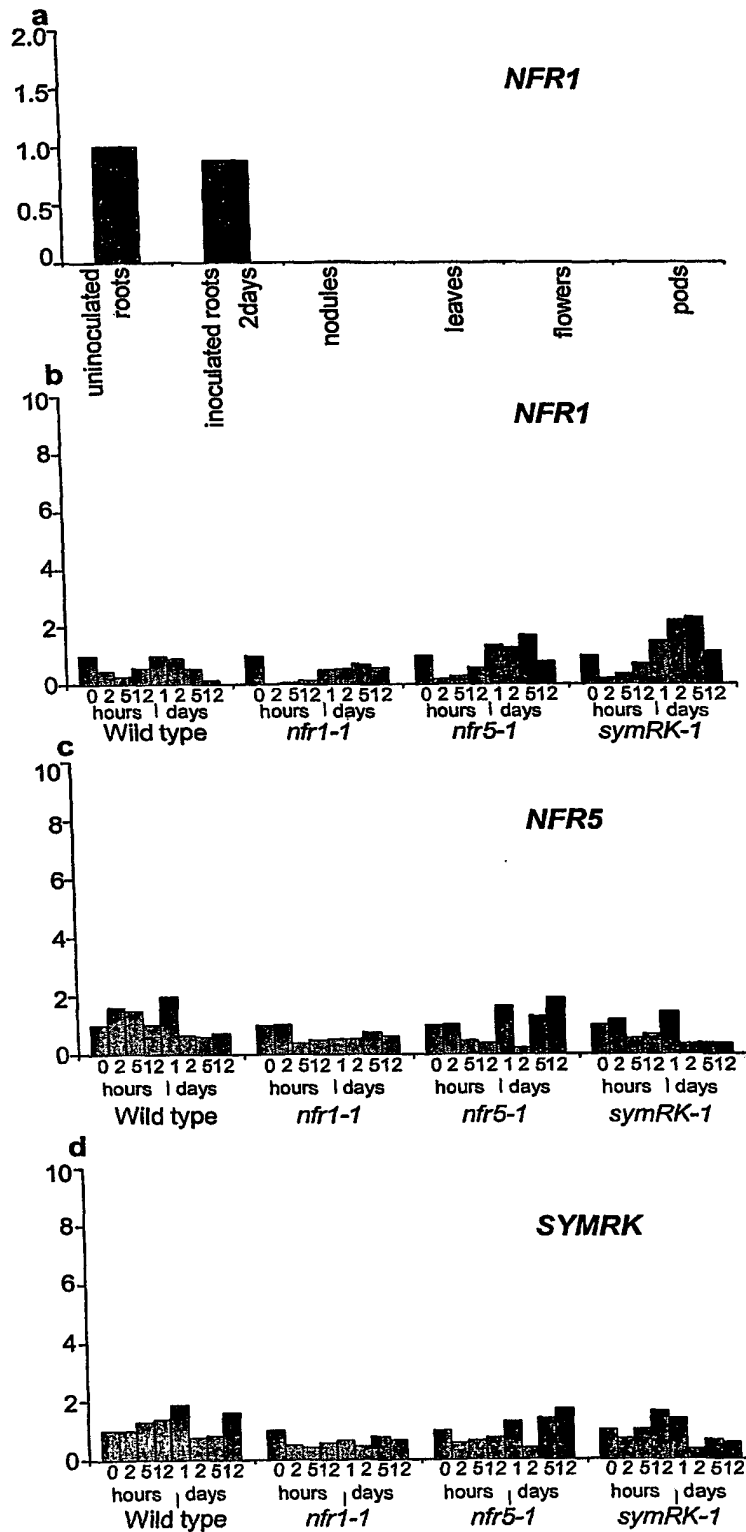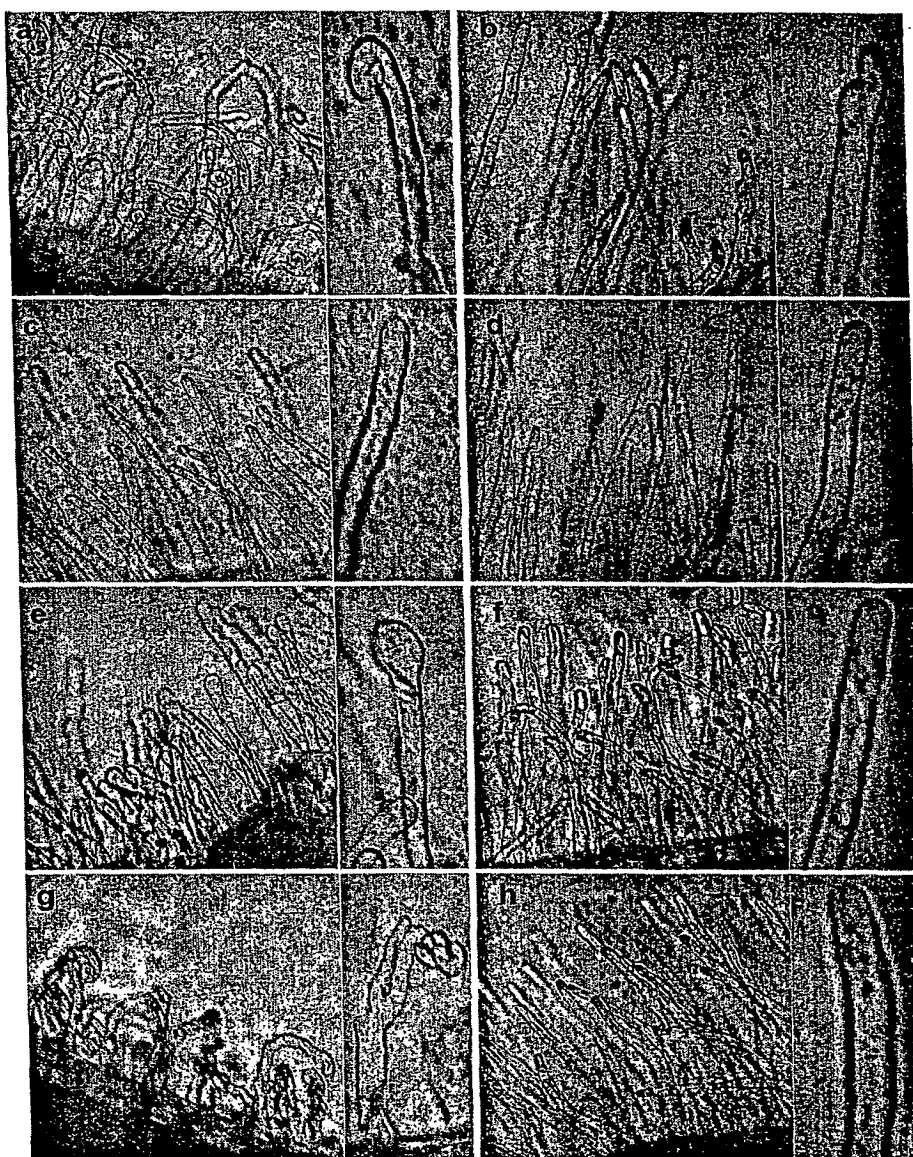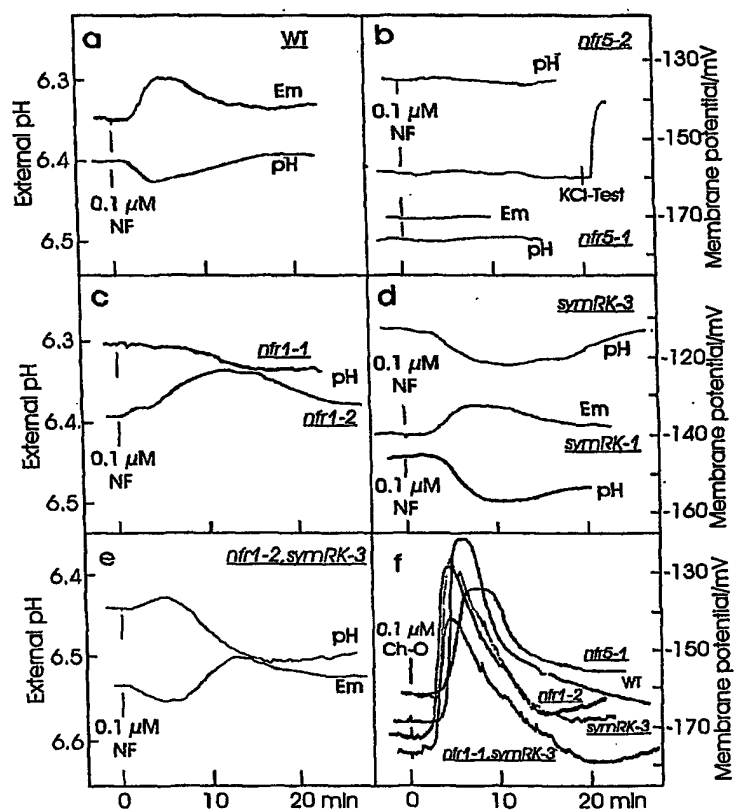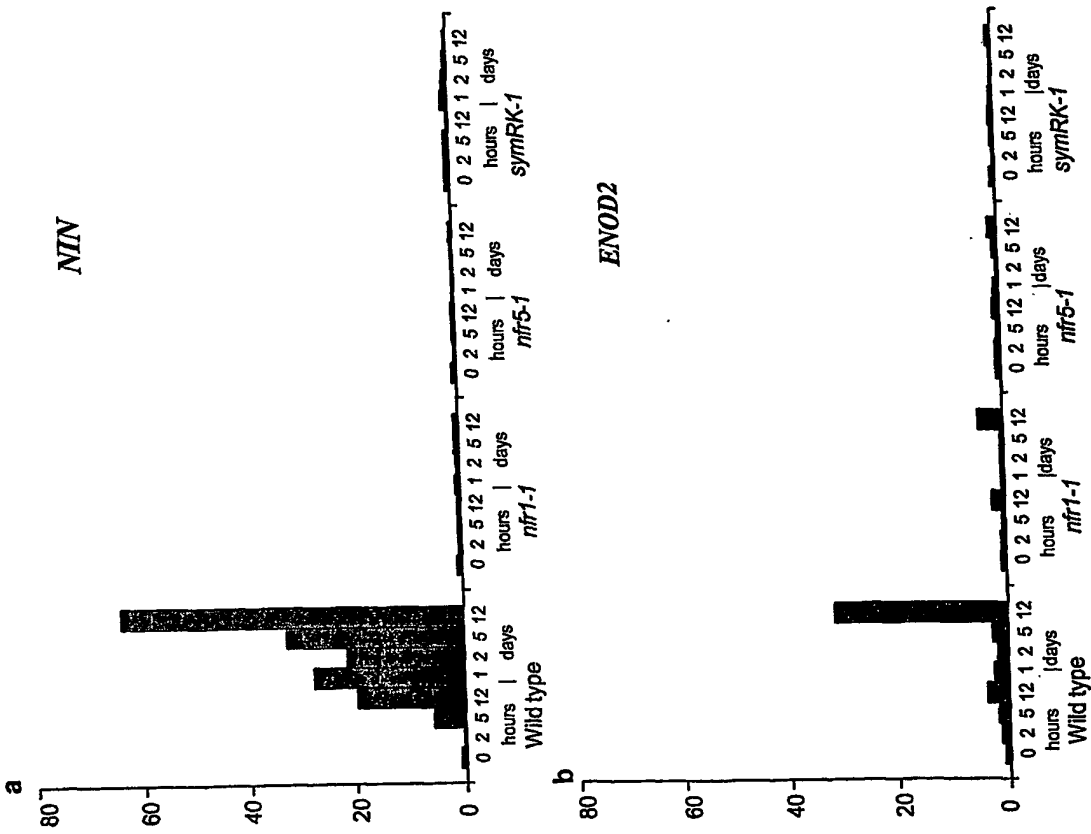
Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

```
NFR1    1: MK...LKIG.DLLFFILLFGHVCFHVESNCLKG.....C...D..LALASYIL....PGVFILQNITTFMQSEIVSNDAITSYNKDKILNDINIQSFQRL
NFR5    1: MAVFFITSGSLSLFLALTLFTNIAARSEKISGPDFSCPVDSPPSCETYVTYTAQSPNLLSITNISDIFDISPLSIARAS...NIDAGK.DKLVPG.QVL

NFR1   85: NIFFPCDCIGEFLGHVFEYSASKGDTYETIANLYYANLTTVDLLKRFN.SYDPKNIPVNAKVNVTVNCSCGNS.QVSKDYGLFITYPIRPGDTLQDIAN
NFR5   96: LVPVTCGCAGNHSSANT.SYQIQLGDSYDFVATTLYENLTMWNIVQASNPGVNPLLPERVKVVFPLFCRCPSKNQLNKGIQYLIITYVWKPNDNVSLVSA

NFR1  183: QSSLDAGLTQSFN.PSVNFSKDSGI.AFIPGRYKNGVYYPLYHRTAGLASCAAVGISTAGTFVILLLAFCMYVRYQKKEEEKAKLPTDISMALSTQDASS
NFR5  195: KFGASPADILTENRYGQDFTAATNLPILIP....VT..QLPELTQPS...SNCRKS..SIHLLVILGITLGCTLL.TAVLTGTLVYVYCRRKKALN.RTASS

NFR1  281: SAEYETSGSSGPGTASATCLTSIMVAKSMEFSYQELAKATNNFSLDNKIGQGGFGAVYYAELRCKKTAIKKMDVQASTEFLCELKVLTHVHLNLVRLIG.ELKILQKVNHGNLVKLMG
NFR5  283: AETADKLLSG......VSGY....VSKPNVYEIDEIMEATKDFSDECKVGES....VYKANIEGRVVAVKIKEGGANE

NFR1  381: YC..VEGSLFLVYEHIDNGNLGQYLHG.SGKEP.EPWSSRVQIALDAAARGLEYIHEHTVPVYIHRDVKSANILIDKNLRGKVADFGLTKLIEVGNSTLQ
NFR5  367: VSSGYDGNCFLVYEYAENGSLAEWLFSKSSGTPNSLTMSQRISIAVDVAVGLQYMHEHTYPRIIHRDITTSNILLDSTFKAKIANFAMAR.....TST..

NFR1  476: TRLVGTFGYMPPEYAQYGDISPKIDVYAFGVVLFELISAKNAVL..KTGELVAESKGLVALFEEALNKSDPCDALRKLVDPRLGENYPIDSVLKIAQLGR
NFR5  459: ..........NP.....MMPKIDVFAFGVLLIELLTGRKAMTTKENGEVVMLWKDMWEIFDIEENR...EERIRKWMDPNLESFYHIDNALSLASLAV

NFR1  574: ACTRDNPLIRPSMRSLVVALMTLSSLTEDCDDESSYES.........QTLINLLSVR
NFR5  540: NCTADKSLSRPSMAEIVLSLSFLTQQSSNPTLERSLTSSGLDVEDDAHIVTSITAR
```

Figure 12

Protein domain structure of *Lotus japonicus* and *Lotus filicaulis* NFR1 and NFR5 proteins and of the hybrid proteins